factors listed Draft NPDES MS4 Stormwater Permit (Ecology, 2/15/06). These estimates are subject to the assumptions and Countywide Water Quality Monitoring Plan (CWQMP, Brown and Caldewll, Feb '06, revised May '06) and the This file contains multiple, linked worksheets to derive and compare planning level cost estimates for the draft

The "Pierce Co" sheet summarizes and compares costs of the two programs

Effectiveness" which contain itemized costs for each of these 2 respective MS4 monitoring requirements The "MS4 summary" sheet summarizes cost estimates developed in the two other sheets "outfalls" and "BMP The "Pierce Co details" sheet contains labor effort estimates for the CWQMP LTT and TD monitoring

There are two levels of CWQMP cost estimates: one for the 9 L∏ stations and another for the 25 L∏ station

submittal schedule for the QAPP and the final report for 20 samples, a likely practical limitation given the apparent 2 year sampling period dictated by permit There are two levels of MS4 BMP Effectiveness monitoring: one for the required 35 sample sets, and another

\$50/hr are assumed for the CWQMP and \$80/hr for the MS4 permit work. Labor costs can be changed to examine alternative scenarios and the spreadsheets will re-calculate; values of

20%), labor hours per sampling event, false start and failure rates, equipment costs, etc Other variables are also included in the calculations and can be changed, including QC sample rate (assumed

Developed by Brown and Caldwell, March 2006, revised May 2006 (revisions in green shading) to

- 1) increase field labor needs for B-IBI and physical channel monitoring under the LTT program
- 2) add lab costs for B-IBI sample analysis (\$110 per sample, totaling \$330 for 3 replicates at each site)
- 3) increase MS4 permit outfall sampling costs for sediment parameters due to Fact Sheet pg 51 Table

Annual Costs for Pierce County Monitoring Program Options non-recurring costs preceded by "NR" [labor rates can be varied below and for itemized costs on linked "labor detail" worksheet] REVISED 5/18/06

Draft MS4	Draft MS4 permit, 2/15/06	Outfalls (S8.A)	BMPs (S8.C)	BMPs (S8.C)	Comment/assumption
	scenario	mınimum rgmt	max practical	minimum ramt	
	min # stations	3	8	8	
	min# events	15	<u>N</u> 0	35	35 min # events as inferred in permit
	QC rate	20%	20%	20%	20% high QC for organics, clean metals & overall complexity, at least in first year
	costs below are	annual costs	total program costs		
	analytical	\$ 81,000	000'66 \$	\$ 174,000	74,000 current ARI lab rates, \$600/sample assumed for specific pest/herbicides
	analytical QC	\$ 33,000	\$ 000,000		70,000 QC blanks & dupes at same cost per sample
	labor	\$ 75,000	\$ 431,000	\$ 755,000	755,000 using consultants at \$80/hr, with 1 talse start and 1 failure per quarter
	sediments	\$ 24,000	in above	in above	in above 3 sed samples/year, 3 days/sample for 2 consultants at 3 outfalls
	acute WET	\$ 2,000	na	na	na assumes WET labor concurrent with other sampling, but takes planning
	flow control BMP	na	\$ 67,000	\$ 67,000	
	reporting	\$ 40,000	\$ 32,000	\$ 32,000	32,000 1 annual report per year
	NR equipment	\$ 30,000	\$ 80,000	\$ 80,000	80,000 \$10K per auto sampling station (sampler, flowmeter, housing), installed
	NR QAPP	\$ 40,000	\$ 40,000	\$ 40,000	40,000 one time cost, approval required, assume one QAPP per program element
	first year	\$ 325,000	\$ 454,500	\$ 669,000	
	succesive year(s)	\$ 255,000	\$ 334,500	\$ 549,000	
	5 year cost	\$ 1,345,000 \$	\$ 789,000 \$	\$ 1,218,000	
	Grand Total	\$ 2,140,000	2,140,000 max practical (i.e. 20 pairs of BMP effectiveness samples)	s of BMP effectivene	ss samples)
		\$ 2,570,000	2,570,000 implied minimum (i.e. 35 pairs of BMP effectiveness samples	pairs of BMP effective	eness samples)

Other assumptions for MS4 permit estimate:

- 1. BMP effectiveness: assume 2 year sampling program given permit schedule dictates
- 2. False starts (insuff rain/duration) and sampling failures (eqpt/human error) assumed to expend 1/2 of the labor needed for a successful event (3 days for team of 2)
- Assumes 3 outfalls and 4 BMPs (station pairs) to sample per event. 3. For simplicity, sampling labor assumes same effort per event for outfall and BMP sampling: 3 days for team of 2, which includes storm tracking, mobilization, demobilization, etc.
- 4. Assumes consultants used due to 24-7 availability needed to meet requirements
- grab or composite (time or flow) 5. No other costs included for acute WET because permit does not specify acceptance (min survival) criteria, consequences or follow up (TIE) for toxic result, or if tests based on
- 6. For QAPPs, requirement of "one per BMP" as permit states is probably unneccesary and a single QAPP should suffice for each program element (outfalls and BMPs).

 7. minimum # sampling events as inferred in permit, but likely max of 20 would be practical limit for BMP effectiveness given apparent 2 year duration.

Cost estimate for typical TMDL study for fecal coliforms using the MST approach

hours for final report	hours for draft report	ancillary parameters, cost per sample	E. coli test, cost per 3 replicates	cost per isolate	goal for # MST isolates	labor rate	labor, man hours per sampling event (team of 2)	total # samples	number baseflow sampling events per year	number stormflow sampling events per year	number stations per stream/subbasin	number of streams/subbasin	study duration, yrs	Scope assumptions value
100	300	\$325	\$75	\$75	800	\$50	16	108	တ	12	တ	_	_	
one round of review and edits	includes data review, validation and synthesis	total lab cost of \$400/sample including E. coli, and excluding MST isolates	need 3 replicates per sample to yield sufficeint # of non-confluent colonies	isolates (ribotyping) IEH laboratory (Mansour Samadpour)		\$90 County labor assumed \$50/hr, consultant labor assumed \$80/hr	same for storm and baseflow events, assumes 1 8-hr day for team of 2 to sample 6 sites							comment

						7.70			Item	
total \$	PM \$	final report \$	draft report \$	total analytical \$	total MST \$	total sampling labor \$	supplies \$	QAPP \$	using	
201,000 \$	18,260 \$	5,000 \$	15,000 \$	43,200 \$	60,000 \$	14,400 \$	5,000 \$	40,000 \$	using County labor using	Cost
232,000	21,012	9,000	27,000	43,200	60,000	25,920	5,000	40,000	using consultant labor	
rounded up to nearest \$1K	10% PM rate							QAPP by consultant	comment	

scale up options \$

233,000 \$ 249,000 \$ 312,000 \$

263,000 for 10 stations, 1 stream 279,000 for 6 stations 2 streams 343,000 for 10 stations 2 streams

[labor rate and other effort factors can be varied and summaries will re-calculate] Labor Cost Summary of Feb 06 Draft CWQMP Long Term Trend (LTT) and Targetd Development (TD) Approaches

Labor costs and hours per station per year using County labor at assumed rate

LTT (single stations)			effo	effort factors			
ltem	cost	hrs/yr h	hrs/event e	events/yr #	# FTEs	rate	comment
BIBI sampling	\$ 400	8	4.0	_`	2	\$ 50	doubled labor to 4 hrs/site (2 sites/day vs 4 sites/day)
BIBI data analysis	\$ 300	6	6.0	1	1	\$ 50	- 1
BIB sample analysis (3 reps)	\$ 330	7	6.6	1	1	\$ 50) Aquatic Biology Assoc, \$110/sample rep, for 3 reps=\$330
phys channel	\$ 800	16	8.0	1	2	↔	50 doubled labor to 8 hrs/site (1 site/day vs 2 sites/day)
phys channel data analysis	\$ 600	12	12.0	1	1	\$	50 annual data synthesis (not reporting)
in situ bioassay labor	\$ 1,000	20	5.0	2	2	3	50 2 visits per year, 5hrs per site for team of 2 FTEs
in situ bioassay data analysis	\$ 1,000	20	10.0	2	1	\$	lab dupe, data capture, data synthesis
total per station per year	\$ 4,430	89					
							i) in-situ bioassay memod validation/training not included guipment costs not included
TD (station pairs)		,	effo	effort factors			
Item	cost	hrs/yr t	hrs/event e	events/yr #	#FTEs	rate	
continuous mon labor	\$ 6,000	120	4.0	15	2	\$	50 weekly visit first month, then monthly: 4 hrs/station pair tor 2 FTEs
continuous mon data analysis	\$ 4,800	96	8.0	12	1	\$	50 monthly data synthesis and summary; 1 day effort per station pair
phys channel	\$ 800	16	8.0	1	2	\$	50 doubled labor to 8 hrs/site (1 site/day vs 2 sites/day)
phys channel data analysis	\$ 600	12	12.0	1	1	\$	50 annual data synthesis (not reporting)
in situ bioassay labor	\$ 1,600	32	8.0	2	2	\$	50 2 visits per year, 8hrs per station pair for team of 2 FTEs
in situ bioassay data analysis	\$ 1,000	20	10.0	2	1	\$	50 lab dupe, data capture, data synthesis
total per station pair per year	\$ 14,800	296					

Cost Estimate Summary for Counties to meet MS4 Stormwater Monitoring Requirements (based on 2/15/06 draft permit) assumes independent option selected, also, Ports have different scope revised 5/18/06 to include cost of sediment analysis per Fact Sheet pg 51 Table

																ſ
13,333 \$ 85,000 not including QAPP	85,000 r	3,333 \$	⇔		0	500	8,000 \$	S		304	25,000	↔	38,000	program duration, yrs per outfall per year \$		
40,000 \$ 252,000 not including eqpt	252,000	10,000 \$	↔		0	1,500	24,000 \$	ca ca		913	\$73,000	_	113,000	per year \$		
	200,000 \$1,328,000)0,000 \$	ॐ	40,000	∵	8,000	0,000 \$	63	\$ 30,000	4,563	\$ 365,000	\$	565,000	Outfall monitoring \$		S8.A
	ta	Annual Report total	Annual F	U	QAPP		sediments WET	sedime	qpt	labor cost labor hrs eqpt	ost I	labo	analytical		Program Element	Prog
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																3

Program Element	ment		analy		labor		labor hrs eqpt	ege	Ē	ΰV	flow control QAPP	Q A		Annı	ıal Report		Fina	Annual Report Final Report	Final Report
B	BMP Effectiveness		↔	99,000	↔	431,000	5,388	S	\$ 80,000 \$ 67,000 \$ 40.	ઝ	67,000	⊹	8	⇔	16.00C	-1	_ ج	000 \$ 16,000 \$ 16,000	\$ 16.000 \$ 749.00
		per event	↔	4,950	↔	21,550	135										-		120
		year 1	6 9	49,500	69		2,694	69	80,000	69	33,500 \$		40,000	69	8,000	ō	Ō	ō	9 430,000
		year 2	69	49,500 \$	69	215,500	2,694			69	33,500				,		64	\$ 16.000	\$ 16.000 S
		# events		20															
		# sites		4															
	program (program duration, yrs		2															

Program Element S8.B Program Effectiveness
not included

Cost Estimate for 2/15/06 Draft MS4 Permit Stormwater Outfall Monitoring Portion (S8.A) revised 5/18/06 to include cost of sediment analysis per Fact Sheet pg 51 Table

			Yadi														
\$ 1,790	analytical	cost	years of Informeding III tills estillate	of moniforms in	acute WET samples per year	ŵ	ç	labor hrs per event per outfall			# fail.	# false st	# eve	total # outfa	# outtails	:	C
\$1,280 \$3,070	labor	cost/event/outfall	ullo esullate	his patients	oles per vear	sample types:	sample types: FW Comp "full duration"	nt per outfall	labor rate	QC rate	# failures per year	# false starts per year	# events per year	total # outfalls to sample	# outrails per landuse	# landuses	Cost Estimate Factors & Assumptions
\$3,070	total		c	n		Grab '	W Comp	6	\$80	20%	4	4	5	٤:			actors &
\$1,920 \$1,920 \$ 32,220 \$37,590 \$24,320 \$	false start, ea failure, ea QC analyt analyt	other costs				"earlyand skimmed" implies manual sampling as only means		3 days for team of 2 (6man days) to service 3 outfalls			1 per qtr; no analytical spent, but use 50% ot event labor	1 per qtr; no analytical spent, but use 50% of event labor				commercial, LDR, HDR for COUNTIES, Cities do Ind instead of LDR	Assumptions
\$37,590 \$24,	analyt labor					g as only means	odifying sampler	tfalls			int labor	int labor				Ind instead of L	
500 \$ 7,860 \$	r WET sediments total	total annual costs per outfall					difficult to do without modifying sampler or nursing it to renew bottles	"calculate annual, seaonsal loads for storm and baseflow"	 "long term program for trends" 	 sample sediments 3 times per year 	 assumes WET sampling labor concurrent with routine event 	 does not include TIE for WET 	 do acute WET annually in one summer/fall storm per year (no consequences) 	 provide flow-weighted composites for list, and manual grabs for TPH and bacteria 	 sample 75% of the storms up to 15 events per year (75% would likely be >15 events, so use 15 min) 	DR sample 3 outfalls in the entire county, each representing a single lumped landuse	Narrative:
70,270 \$	<u>6</u>							oads for st	S.	er year	or concurre	-	ne summer.	osites for lic	ວ to 15 eve	в county, е	
10,000	eqpt							orm and t			nt with ro		/fall storm	st, and ma	ints per ve	ach repre	
70,270 \$ 10,000 see MS4 summary	ann report final report	reporting)aseflow"			utine event		per year (no consequent	anual grabs for TPH and	er (75% would likely be >	senting a single lumped la	
\$ 210,810 \$ 1,084,050	annual	total											es)	bacteria	15 events, so use	anduse	
\$ 1,084,050	total														15 min)		

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MS4 Permit BMP Effectiveness Monitoring Portion
Comparison of the two draft versions of permit requirements
elements compared side by side, crosshatched where absent in one or the other draft version
significant changes shaded gray

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Cost Estimate for 2/15/06 Draft MS4 Permit Stormwater Monitoring for Treatment BMP Effectiveness (S8.C)

Scope Narrative, per permittee

- 4 BMP installations with a pair of auto samplers and flowmeters at each BMP inlet and outlet=8 monitoring stations.
- 1 flow control BMP (paired inlet/outlet continuous flow monitoring)
- full QAPP+TAPE for each BMP (thus, 2 QAPPs, but that is not necessary, so assume single QAPP)
- Implement by end of year 2, sample ~2 years, submit final report by end of year 4
- assume min 20 events (up to 35 in ~ 2 years is unlikely achievable)
- false starts (good samples, bad events) and system failures (bad samples, good events) will be significant
- sediment samples ot accumulated sediment in each BMP-permit text vague, assume bulk samples collected at 1/2 the

stormwater sampling trequency, assume labor incidental to stormwater sampling

# faise starts	# events 2	Cost Estimate Factors & Assumptions
8 1 per qtr; no analytical spent, but use 50% of event labor	20 full analytical & labor, completed in 2 years	Assumptions

failures QC rate labor rate 8 1 per qtr; no analytical spent, but use 50% or event labor 20% filed egpt blanks and dupes for all params \$80 consultant supported 48 3 days for team of 2 (6 man days) 50 (100 hours for program per year for 2 years) 100 (200 hours total for final report)

Ising, supplies, installation labor telemetry option

2,000 plastic garden shed or steel utility box 8,000 OEM system, cell phone uplink 4,000 meeded for round pipes 3,000 for open channels weis flumes

sampler flowmeter

approximate eqpt costs

labor hrs per event per BMP sampling station pair labor hrs per annual report per BMP family labor hrs per final report per BMP family

D.M.D	w control labor 48	
Continuent/Oldo	480 total hours over 2 years (1	
	years (12 man weeks) for single site for flow monitoring, data synthesis and evaluation	

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this portion of the cost estimate does not include QAPP development does not include mileage, supplies and other ODC

total reporting labor hours in above total annual report hours (2 annual reports) total final report hours

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32,000

field labor months in above field labor hours in above field labor days in above

5,856 732 37

2,928 includes flow control labor 366 18

per person